

# NEUROPSYCHOLOGICAL ASSESSMENT OF FITNESS TO DRIVE: SUBJECTIVE PERCEPTION AND COGNITIVE PERFORMANCE

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## Object

Older drivers want to keep driving as long as possible but several sensory, motor and cognitive deficits could limit this purpose. The detection of minimum driving standards is still an open question. However, some older drivers "self-regulate" driving behavior to minimize the risk of accidents<sup>1</sup>. Our study had three aims: a) to evaluate whether elderly' cognitive abilities were related to self-reported and caregivers accounts of driving behavior, resulting in increased risks of traffic accidents; b) to verify the agreement among these declarations provided by both groups; c) to analyze a possible relationship between impulsiveness and driving behavior statements.

## Materials and Methods

A series of standardized neuropsychological tests were administered to evaluate the main cognitive functions considered relevant for driving<sup>2</sup>, in addition to the two questionnaires (Driver Behavior Questionnaire-DBQ and Barratt Impulsiveness Scale-version 11, BIS-11), to obtain measurements on driving behavior and impulsiveness.

Twenty-six subjects were enrolled and underwent cognitive evaluation including behavioral questionnaires. DBQ and IADL (Instrumental Activities of Daily Living) were also administered to nineteen caregivers out of twenty-six, to assess daily autonomy and the frequency of errors and violations committed by older drivers. Spearman's Rho nonparametric analysis and Pearson's correlation were used to investigating the relationships between the performances on neuropsychological tests and the DBQ responses. The Pearson's correlation was also adopted to verify agreement among the two groups at the DBQ.

## Results

Significant positive correlations were found between: a) IADL and the DBQ's Lapses factor [Fig.1]; b) Trail Making Test-A scores and self-reported DBQ violations [Fig.2]; c) BIS-11 total score and DBQ violations reported by both groups. Finally, the two groups reached an agreement only on the DBQ's Lapses [Fig.3].

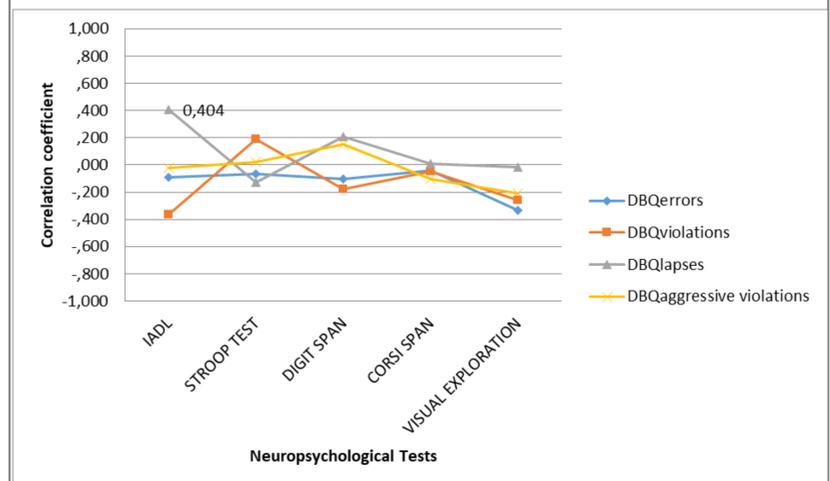
## Discussion

The study showed that the level of autonomy of elderly subjects is directly proportional to the awareness of their driving problems, supporting the hypothesis of conscious self-regulation of driving in elderly subjects<sup>1</sup>. The importance of executive functions in the driving activity was also confirmed<sup>3</sup> the older drivers with attention-executive difficulties reported frequent ordinary road traffic violations. Furthermore, impulsive behavior was associated with the frequency of driving violations. The agreement among the two groups only on the Lapses factor was probably due to a sampling bias.

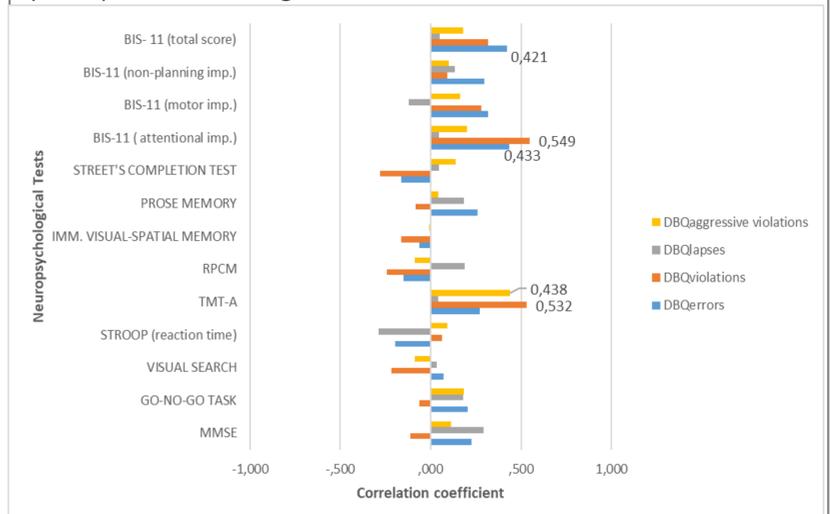
## Conclusions

We found a relationship between self-referred driving behavior and cognitive performances in elderly drivers. This result, if confirmed by further studies, could allow early detection of subjects with a high risk of dangerous driving behaviors.

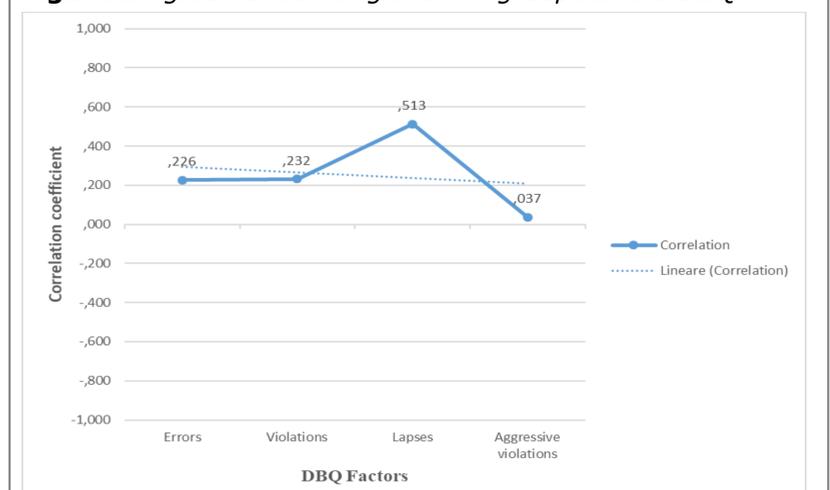
**Figure 1** Non-Parametric Correlation Analysis (Spearman's Rho) between patient ratings of driving behaviour and cognitive performances.



**Figure 2** Parametric correlation analysis (Pearson) between neurocognitive performance and subjective perception of driving behavior.



**Figure 3** Agreement among the two groups at the DBQ.



## References:

- Ang, B. H., Oxley, J. A., Chen, W. S., Yap, K. K., Song, K. P., & Lee, S. W. H. (2019). To reduce or to cease: A systematic review and meta-analysis of quantitative studies on self-regulation of driving. *Journal of Safety Research*, 70, 243-251.
- Wagner, J. T., & Nef, T. (2011). Cognition and driving in older persons. *Swiss medical weekly*, 141 (0102).
- Adrian, J., Moessinger, M., Charles, A., & Postal, V. (2019). Exploring the contribution of executive functions to on-road driving performance during aging: A latent variable analysis. *Accident Analysis & Prevention*, 127, 96-109.